# Pre-Columbian deforestation as an amplifier of drought in Central America

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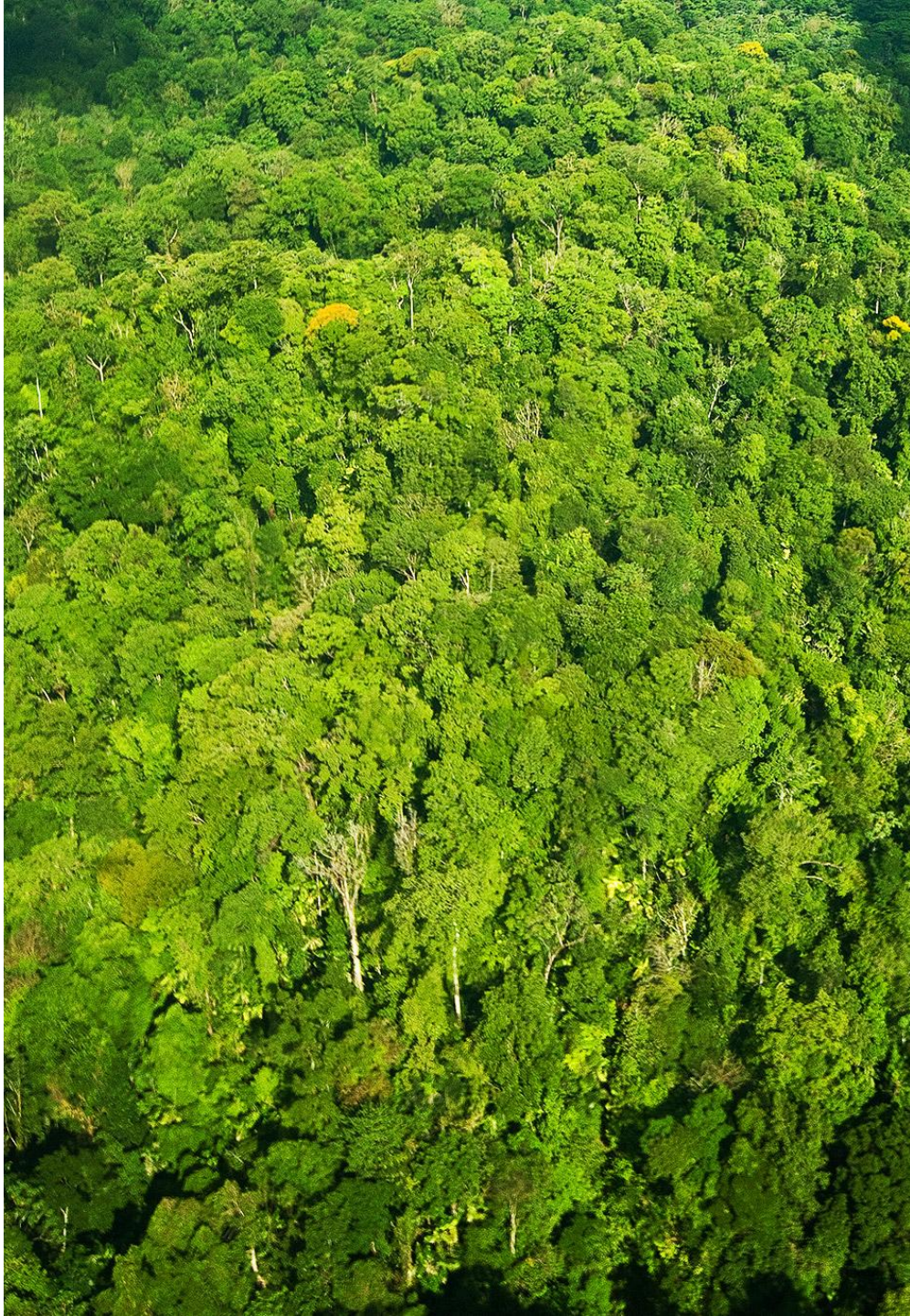
# Pre-Columbian Central America

- Home to over 19 million people
- Sedentary agricultural societies
- Major population crash after European conquest
- Landscape probably looked less like this →



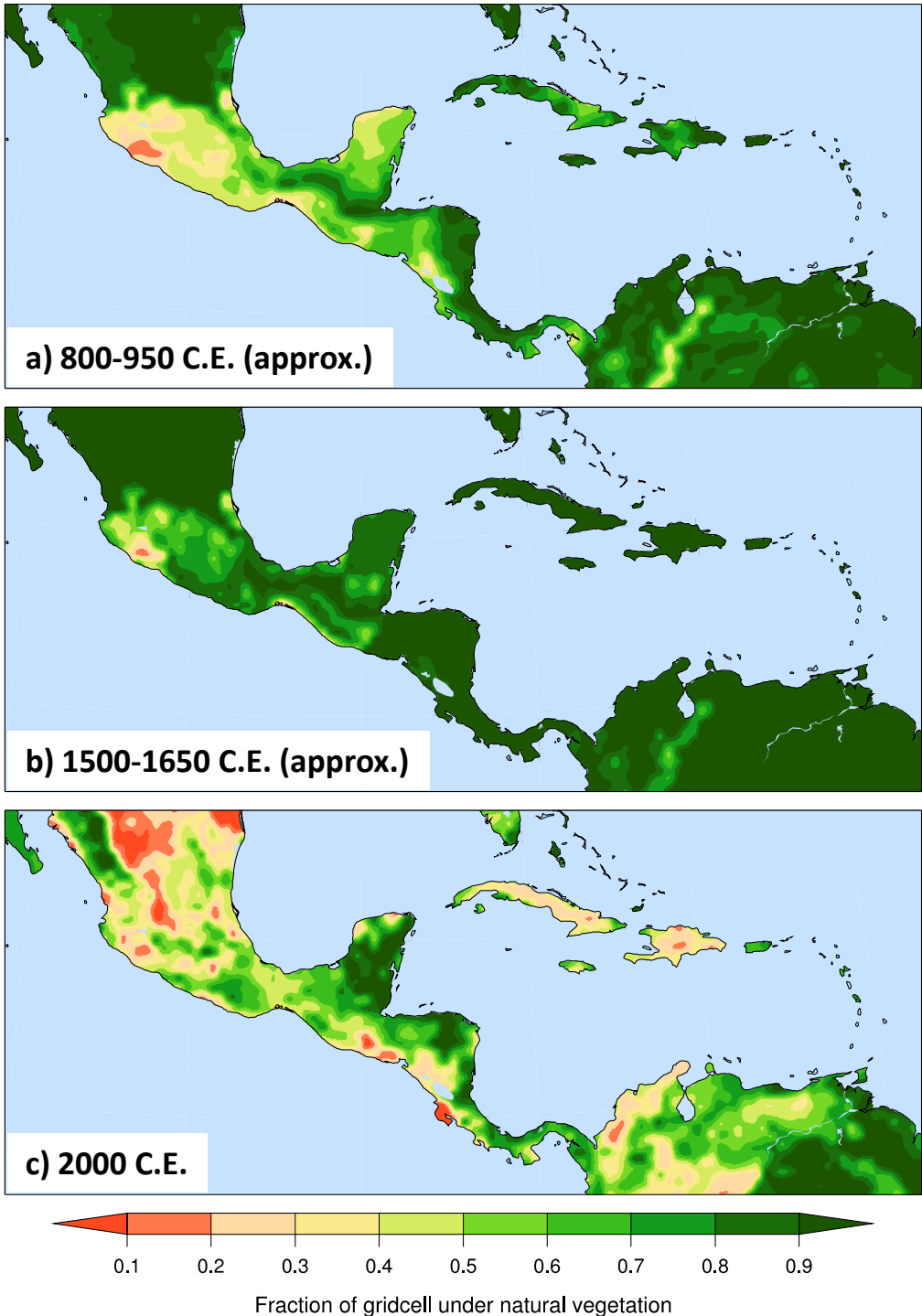
# And more like this. . .

# Pre-Columbian Droughts

- Impacted Maya, Toltec, Aztec…
- Causes?
- Solar forcing, random variability
- Could deforestation have contributed?

# Land Cover Reconstruction

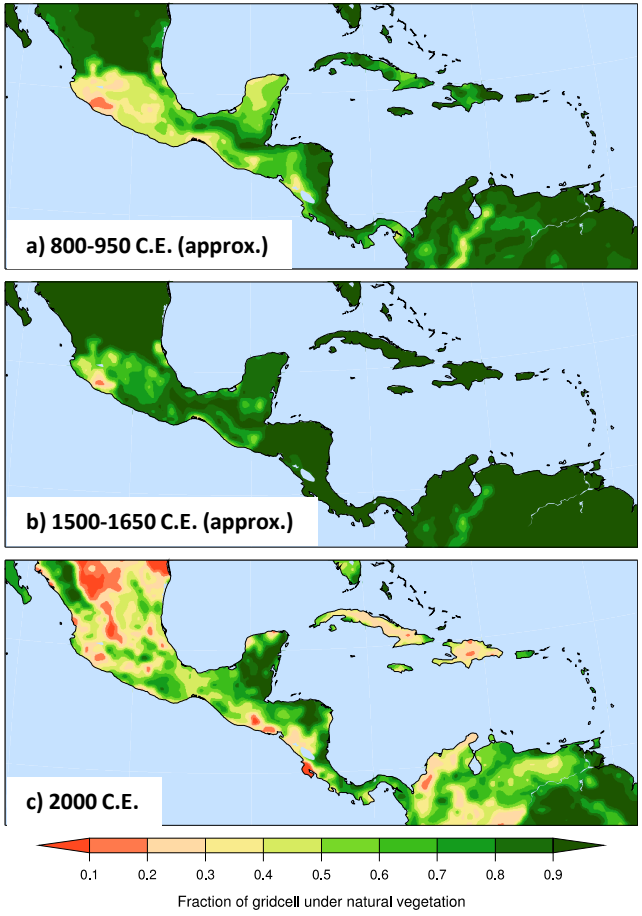
- Based on population
- Varying per capita land use; arable land restriction
- More extensive/intensive land use than previous reconstructions
- New input for climate models

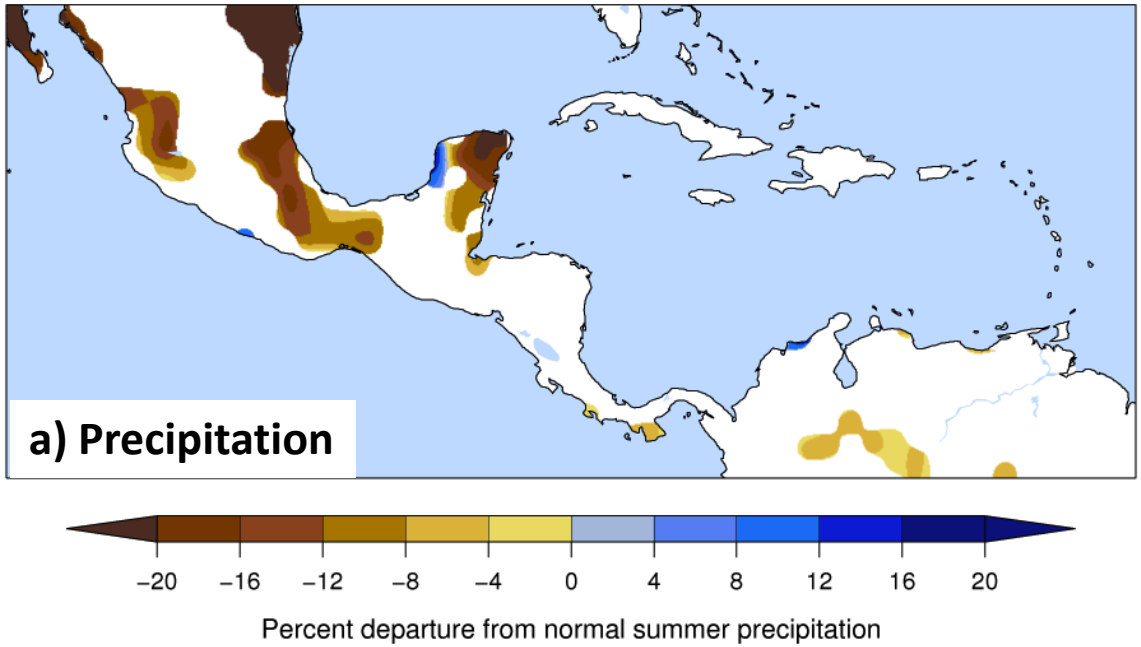


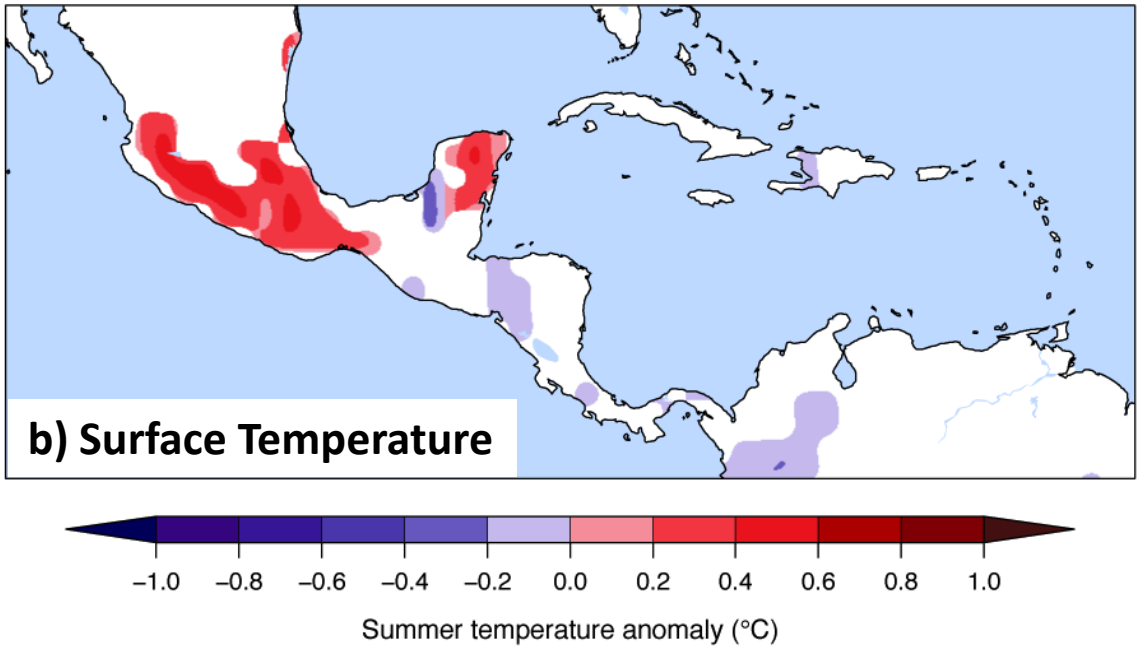
# Experiments

- **NATVEG**: Natural vegetation only; no crops or anthropogenic land cover
- **DEFOREST**: pre-Columbian land cover
- **REGROWTH**: post-Columbian land cover
- Compared against paleorecords from the Yucatán

# NATVEG minus DEFOREST



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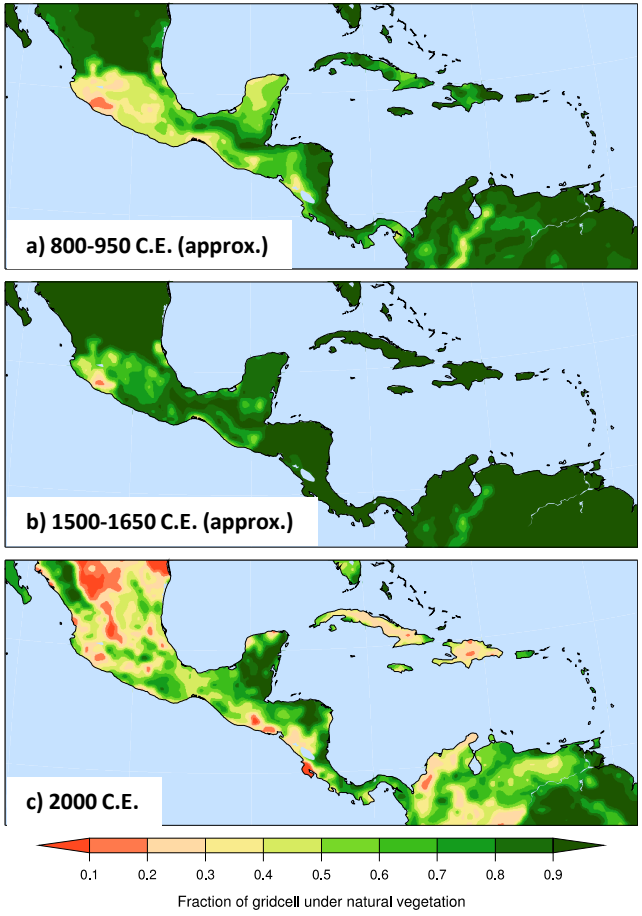
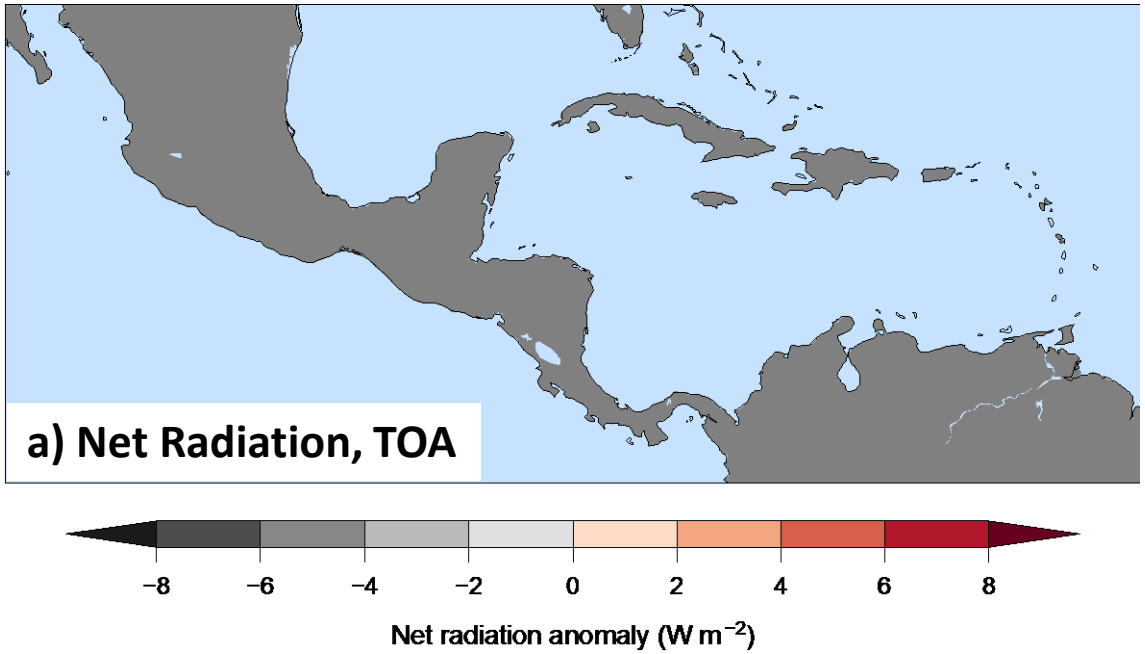
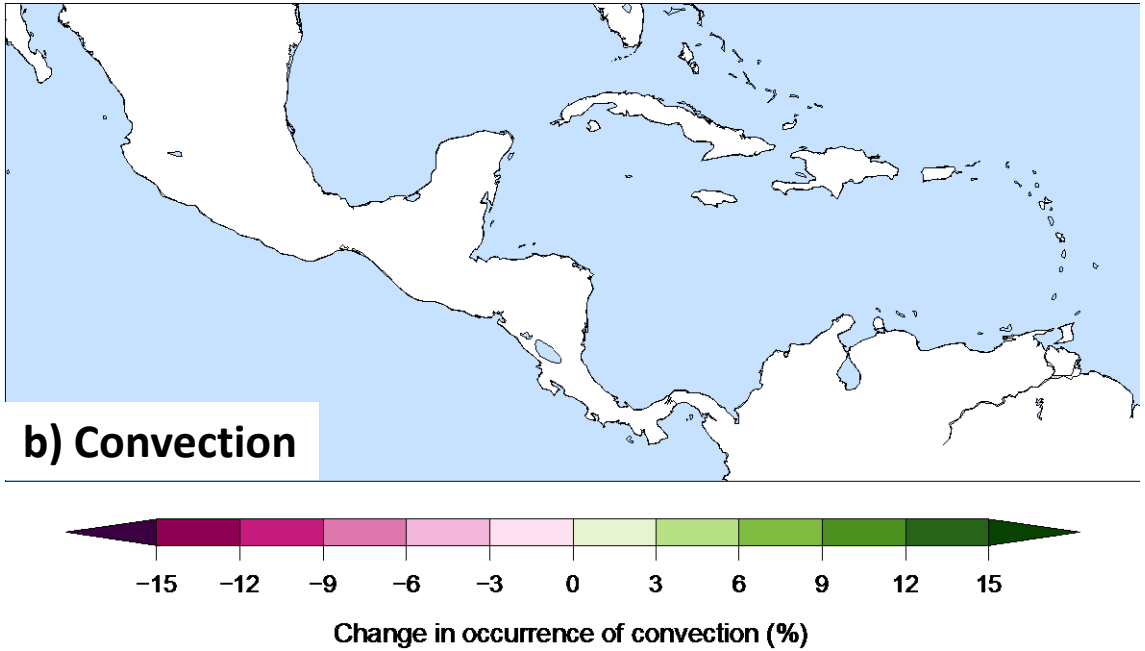
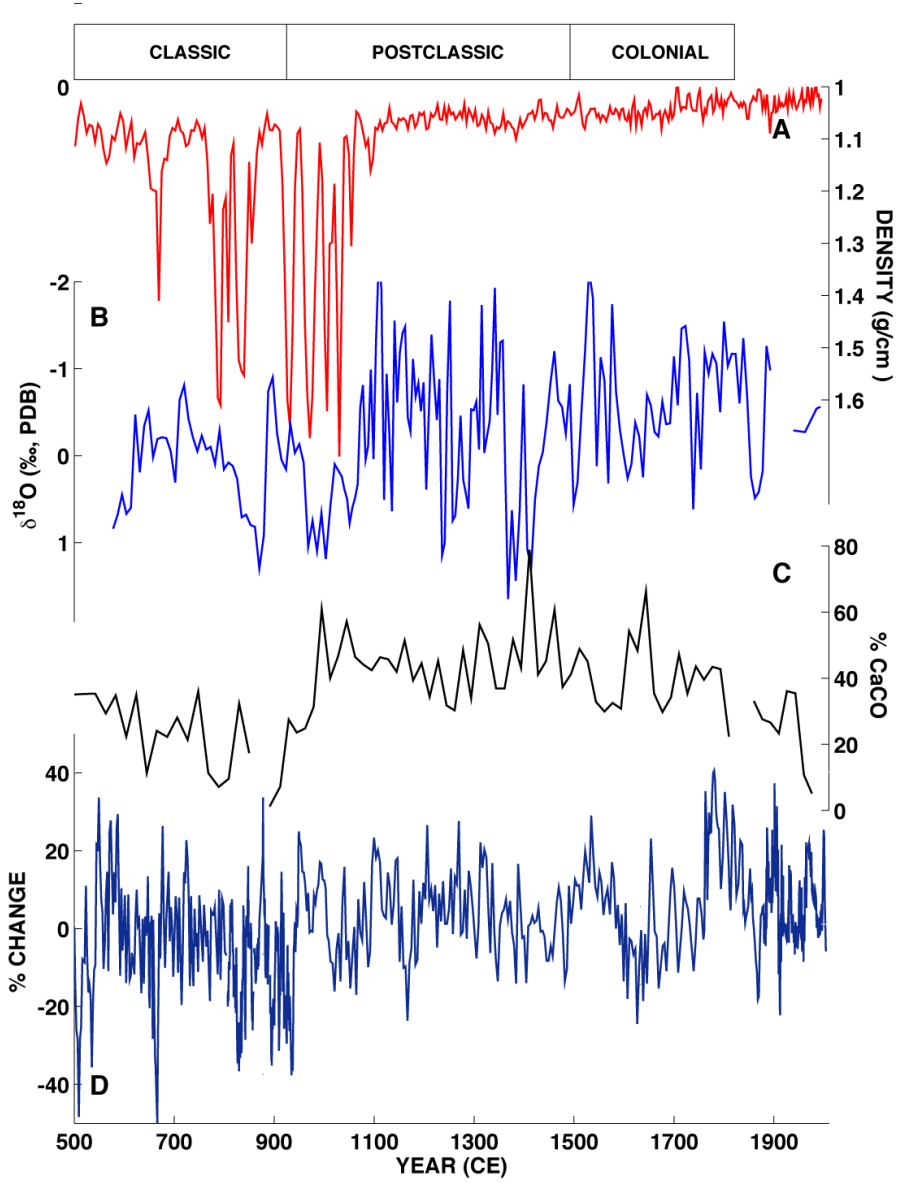


# Yucatán: 800-950 C.E. vs 1500-1650 C.E.

- Paleo-records indicate regional water balance changes
  *precipitation minus evaporation*
- Lake records, cave records
- Drier Classic/Post-Classic era relative to the Colonial regrowth period
- Hard to convert most to quantitative estimates
- Tzanab Speleothem
  -14% decline in *P-E*



# Conclusions

- Warmer/Drier average conditions with pre-Columbian deforestation (higher albedo, less energy available for convection and precipitation)

- *DEFOREST minus REGROWTH*:
  -18% decline in JJA *P-E* (-6%, annual), comparable to Tzanab (-14%)

- Future deforestation in the Yucatán?